The Claims

What I claim as new, for which protection by a Letters Patent is applied for, are as follows:

CLAIM-1: A new apparatus that minimizes the usage of the clean drinking water and maximizes the usage of low-grade water in habitation communities, particularly and specifically those that do not have other water source but totally supplied by public water entities, the apparatus serving as a means for solving water shortages and for minimizing costs,

wherein, a special pipeline assembly is constructed/installed in every house/facility, made separate and distinct from the clean drinking water pipeline in the house, made particularly for conducting and carrying low-grade water from a source, including subterranean and recycled water, into the toilets, hydrants, gardens and parks of every house/facility situated in communities --- *particularly/specifically those that are totally dependent upon a public water supply entity or a Metropolitan Water District,* --- in order to save the clean drinking water;

Wherein, the low-grade water is specifically used for cleaning and flushing the toilet, for firefighting, for laundry, and for irrigating the plants/gardens, in various facilities including, but not limited to, residential/commercial buildings and parks/golf courses, -- to name a few, in order to save the clean drinking water that is being expensively brought-in from a distant source or a desalination plant;

wherein, in a household or in a building, the toilet is separated by a permanent wall from the shower room and lavatory room to make sure that there is no drinking water mistakenly getting into the toilet room;

wherein, the clean drinking water supply pipeline is constructed and connected to no other else than the kitchen sink, to the shower/lavatory room, to the laundry machine, and to the drinking faucet/fountain only, --- *to make sure that the drinking water does not mistakenly get into the toilet*;

wherein, the low-grade water supply pipeline assembly is made to bring abundant

subterranean/underground/recycled/rain water into the building and connected *into the toilets, car/equipment wash, driveway wash, fire sprinkler, and garden faucet* of each building, — in order to avoid using the clean drinking water for such low-grade water functions;

wherein, at least one water deep-well, having a water pump, is constructed/installed under each building or within the private yard of each residential/commercial building and connected to the low-grade water pipelines, — in order to pump out subterranean water and supply it to the toilets of each building, to save the clean drinking water from being wasted into the toilets;

wherein, at least one low-grade un-pressurized water storage/sedimentation first tank at every floor is constructed with its bottom elevated just a few inches above the toilet tank to remove unnecessary high pressure on the toilet water supply and to prevent excessive expenses of energy in pumping the toilet water supply in trying to fill up the storage tank with subterranean/recycled water supply; and

wherein, a Municipal/City/National Law is enacted serving to enforce under penalty of law: (a) the prevention of using the clean drinking water to flush the toilet, (b) the maximum usage of low-grade water, including sea water, recycled water, subterranean water, rain water, and waste water, to flush the toilet, and for other low-grade water usage opportunities, (c) the provision of a water deep-well for all and every old/new house/building/park/playgrounds, etc., (d) the payment of rebates to people who built their own deep-well;

comprising:

a plurality of residential/habitation/commercial house/building dependent upon a municipal/city public water supply district, each having a ground, a property limit, and a yard, situated in a city/municipality and/or in an urban community;

each building having at least one floor level, a first floor and a top floor, a toilet, a shower room, a kitchen sink, a drinking fountain/faucet, and a lavatory wash room --- on all floor levels from the first floor and to the top floor;

a clean drinking water pipe assembly having an inlet connected to the high grade

clean drinking water public supply or the water district, and having outlet branches extended to bring potable water to the building from first floor to the top floor into the building, and specifically connected to no other than: -- to the shower, to the kitchen sink, to the drinking fountain/faucet, to the laundry machine and to the lavatory wash room;

a water deep-well constructed to a few hundred feet into the ground under, or within the property limits of, the building for extracting low-grade subterranean water;

a water pump functionally connected to the water deep-well to pump out the subterranean water to be supplied to the house, having an outlet;

a first header pipe for low-grade water, having a midsection, having an inlet connected to the outlet of the water pump, and having an outlet;

a first one-way check-valve connected/provided at the mid-section of the first header pipe;

a first " T " connector having a first inlet connected to the outlet of the first header pipe, having a second inlet and an outlet;

a gate-valve having an outlet connected to the second inlet of the first " T " connector, and having an inlet;

a second header pipe for low-grade water having an outlet connected to the inlet of the gate-valve, and having an inlet connected to a municipal/public recycled/subterranean water main pipeline;

the check-valve and the gate-valve made readily accessible for switching purposes for emergency use of the municipal/public recycled water;

a toilet water tank provided to flush each corresponding toilet bowl on each floor;

at least one un-pressurized first water tank installed on each floor of the building serving to hold low-grade water, having a bottom just a few inches above the toilet tank to make it low water-head to save pumping energy;

a water pipe connected and intercommunicating the un-pressurized first water tank with the toilet water tank in each floor of the building;

a float control valve, similar to the toilet control float valve, installed inside each first water tank to stop the water from getting in further when the tank is full;

an electric on-off switch, installed in each first water tank, actuated by the float control valve, having wires connected to stop the water pump when the tank gets full;

an assembly of water pipes serving to bring-in the low-grade water into the building, having an inlet connected to the outlet of the first " T " connector and having branches with outlets correspondingly connected to each un-pressurized first water tank on all the floor levels of the building;

a header water pipe, having an inlet connected to a city/municipal clean-drinking water mainline, and having an outlet connected to the inlet of the clean-drinking water pipe assembly into the building; and

a permanent wall constructed isolating the toilet from the shower and wash lavatory to make sure there is no mistake for the clean drinking water getting into the toilet.

CLAIM-**2.** A new apparatus that minimizes the usage of the clean drinking water and maximizes the usage of the low-grade water, serving as a means for solving water shortages and for minimizing costs, in accordance with Claim-1,

wherein, as an improvement, a pressurized second water tank is constructed on every floor of a building for containing subterranean water *specifically from the water deep-well, free from recycled water*, for purposes of sedimentation/filtration/ chlorination and other treatments, -- in order to use the deep-well water for bathing and laundry washing, thereby saving the clean drinking water;

wherein, additionally, a pressurized superheated water tank equipped with a heating device is constructed, separate and distinct from the usual water heater for the public water supply, thru which all the deep-well water from every second water tank is superheated to kill all bacteria/viruses that might be present in the deep-well water, for purposes of further sterilization and to make the water safe enough for bathing and for laundry if chlorination is not sufficient enough;

wherein, in the effort to save fuel and to recapture heat energy, the hot air exhaust from the superheating device is passed thru a zigzag chimney that contains a

coiled water pipe to pre-heat the water getting into the superheating device;

wherein, further, on the pipeline out from the superheated tank going particularly to the shower rooms, an electrocution device activated by water current is connected to insure further that all bacteria/viruses that might be still alive in the deep-well water are killed;

wherein, to save electric power, the deep-well water going to the laundry bypasses the electrocution device, minimizing the quantity of water subjected to electrocution;

wherein, in preparation for the shower, a cooling station pressurized water tank is installed down stream of the electrocution device, serving to provide cold sterilized deep-well water for the shower room;

wherein, to further recapture heat energy, a coil of cold water pipe is installed inside the cooling station water tank, thru which coil the cold water from the second water tank is preheated before passing thru the chimney of the water heater;

comprising:

a second water tank, having a top, an inlet, a first outlet, a second outlet, and a third outlet, set on each floor level of a building/facility, built to contain pressurized water, including compressed air at a pressure enough to sustain shower down to 1/4 of tank's water level, serving as treatment station for the deep-well water;

a float control valve installed inside each second water tank, serving to limit the water level in the tank;

a water deep-well, constructed within the property limits of the building/facility;

a water pump functionally connected to the deep-well, having an outlet and electrical wire power connector, serving to extract water from the deep-well;

an electrical on-off switch installed at the inside wall of the top of each second water tank, and connected to the water pump at the deep-well;

the switch set to be manipulated by the float valve therein, in order to automatically switch on-off the water pump at the water deep-well at corresponding water level inside each tank;

the building having at least one floor level, and having a first floor and a top floor;

each floor having a shower room, a shower head, a lavatory, a laundry room, and a laundry machine;

a water supply header pipeline assembly intercommunicating the outlet of water pump with the inlet of each second water tank from the first floor to the top floor;

the laundry machine having a cold water inlet communicated with the first outlet second water tank;

a pressurized high temperature water-heater tank sited on each floor of the building, installed separate and distinct from the water heater for the clean public drinking water, serving as storage and sterilization station for the water from the deep-well, having one inlet, a first outlet, and a second outlet;

a heating device built inside the water-heater tank, having a hot air exhaust;

a heat insulator or heat barrier wrapped around the water-heater tank;

a zigzag chimney having an inlet connected to the hot exhaust of the heating device;

a cold water zigzag radiator pipe assembly installed inside the zigzag chimney, having an inlet communicated with the second outlet of the second water tank, and having an outlet communicated with the water-heater tank;

a hot water pipe intercommunicating the first outlet of the water-heater tank with the hot water inlet of the laundry machine;

an electrocution device, in the form of a water pipe equipped with internal electrodes and a high voltage transformer, having an inlet communicated to the second outlet of the water-heater tank, a switching mechanism activated by water current, and having an outlet equipped with a gate valve communicated with the shower head and with the lavatory;

a pressurized cooling station water tank, having an inlet communicated with the outlet of the of the electrocution device, having an outlet communicated with a cold water inlet of the shower head and the lavatory, and having a left wall and a right wall;

a coil of radiator tube installed inside the cooling water tank, having an inlet communicated with the third outlet of the second water tank, and a hot outlet communicated with the inlet of the water-heater tank;

the radiator tube's inlet and outlet pierced the left and right walls of the tank respectively;

the shower head and the lavatory each having a hot water inlet;

a hot water pipe having an inlet connected to the outlet of the electrocution device, and having branches communicated with the hot water inlet of the shower head, with the hot water inlet of the lavatory, and with the inlet of the cooling station water tank;

a hot water pipe having branches, equipped with gate valves, intercommunicating a clean public supply drinking water-heater with the hot water inlet of the shower head, of the lavatory, and of the laundry machine; and

a cold water pipe having branches, equipped with gate valves, intercommunicating the main supply pipeline of the public clean drinking water with the cold water inlet of the laundry machine, of the shower head, of the water heater, of the drinking faucet/fountain, and of the lavatory.

CLAIM-**3.** A new apparatus that minimizes the usage of the clean drinking water and maximizes the usage of the low-grade water, serving as means for solving water shortages and for minimizing costs, in accordance with Claim-1,

wherein, additionally, a multistage/multi-chamber waste water storage/recycling device is constructed within the proximity or just below every floor level of a house/building/facility from the first floor to the top floor, serving to collect/store, to treat, to filter, and to recycle the wastewater from the shower, the wastewater from the laundry, and the wastewater from the rain for safe use in flushing the toilet, comprising:

a first stage impervious chamber having: an inlet for rainwater, an inlet for wastewater from the laundry, and an inlet for wastewater from the shower, all built on one side, serving as a digestion and sedimentation chamber;

a second stage impervious digestion chamber having an inlet receiving water from the first stage chamber, serving the same function as the first stage;

a third stage impervious storage chamber serving to store clean recycled water ready

for flushing the toilet;

a common wall constructed between the first and second stage, and between the second and the third stage chambers;

each chamber having an upper fifth section and a lower fifth section;

a siphon pipe in the form of an inverted " U " serving as outlet/inlet between chambers, installed piercing the common walls at the upper fifth sections;

each siphon having a pipe clean-out window extended vertically upward and in alignment with the " U " stem ;

each chamber having a manhole window serving as a means of access for maintenance;

a maintenance window constructed at one side of the upper two fifth sections of the third chamber, made wide enough for service access for mechanical works;

a metal plate cover water-tightly bolted covering the widow;

a rigid water-tight horizontal basin floor constructed/installed across the bottom of the upper fifth section of the third stage chamber;

a vertical nipple pipe of at least 2 inch diameter, equipped with a gate valve at its lower end, water-tightly piercing downward thru the basin floor, made accessible thru the window, serving as filtered water outfall;

a perforated rigid horizontal filter floor constructed/installed at least 3 inches clear above the basin floor, serving as filter bed;

a horizontal nipple pipe of at least 2 inch diameter water-tightly piercing the metal plate cover just above the basin floor, equipped with a gate valve outside the window, to inject water between the basin floor and the filter floor;

a three layer water filter, comprising: a bottom layer of ½ inch diameter gravel, a middle layer of pea-size gravel, and a top layer of sand, evenly laid on the perforated filter floor;

a dirt-water waste disposal outlet pipe of at least 2 inch diameter, water-tightly piercing outward thru a wall at the upper most section of the third stage chamber;

the disposal pipe connected to an irrigation/drying canal or to a sewer pipeline;

a vertical suction pipe having a foot check-valve communicated to the lowest fifth

section of the third stage chamber;

a second water pump having an inlet communicated with the suction pipe, serving to draw water from the third stage chamber, and having an outlet;

a float control switch activator assembly installed a few inches above the foot check-valve, serving to switch on-off the water pump;

a delivery pipe assembly equipped with an upward check valve, and having branches inter-communicating the second water pump with all the un-pressurized first water tanks at all floor levels to flush/clean the toilets; and

a float control switch activator assembly installed inside the first tank at the top floor of the building and connected to stop the second water pump when top floor first tank becomes full.

CLAIM-**4.** A new apparatus that minimizes the usage of the clean drinking water and maximizes the usage of low-grade water, serving as means for solving water shortages and for minimizing cost, in accordance with Claim-1,

wherein, in addition to the municipal mechanically recycled water if any, the subterranean water or underground rivers are tapped in large quantities, such as municipal or county scale, by means of a plurality of subterranean water structures, including water deep-wells, water treatment/sedimentation reservoirs, water pumps, pipelines, etc;

wherein, a plurality of man-made sedimentation/treatment lakes/reservoirs, serving as storage for the low-grade subterranean water drawn from underground, are constructed separate and distinct from the usual reservoirs that store water from distant rivers or neighboring county water supply;

wherein, a plurality of water mainlines and distribution pipelines, separate and distinct from the usual municipal/district clean drinking water supply pipelines, are constructed to distribute low-grade subterranean water to the communities and into the buildings just to flush toilets, for firefighting, for irrigation, and for other low-grade water functions;

wherein, in places where underground water is scarce, including the high desert, a

plurality of man-made lakes or reservoirs having impervious floors and sand filters are constructed, serving as component of a recycling structure, into which the waste water from the sewer treatment plants are deposited/treated and stored for purposes of sedimentation into a clear recycled water;

wherein, the recycled water is injected and mixed into the subterranean water pipelines to augment in the water supply for low-grade water functions, including toilets, firefighting, irrigation, to name a few;

wherein, the recycled water is desalinated and irrigated into the ground, serving, as it is hereby imperatively emphasized, to replace the underground/subterranean water that has been pumped-out by the water deep-wells; and

wherein, in places where the communities are near the sea/ocean, the recycled water is desalinated and irrigated into the ground, serving as it is hereby imperatively emphasized, to create a water-head against the intrusion of saltwater into the land at times when the land is vacated of subterranean water as the deep-wells pump too much,

comprising:

a plurality of water deep-wells with water pumps constructed in various places where the water table is shallow, including valleys and along water streams, serving to draw subterranean water from underground;

a plurality of man-made reservoirs, separate and distinct from the drinking water reservoirs, serving as storage, sedimentation, and treatment stations for the subterranean waters;

a plurality of main pipelines inter-communicating the water pumps with the man-made reservoirs for subterranean waters;

a plurality of water pumps set to draw water from the subterranean water reservoirs;

a plurality of assembled water mains and distribution pipelines, as part and component of the subterranean water structure, inter-communicating the subterranean-water pumps with the communities;

a plurality of sewer treatment plants serving to produce recycled water out of waste water disposed off by the communities;

a plurality of man-made sedimentation lakes/reservoirs, as part/component of the recycle structures, having sand filters and impervious floors, into which the recycled water are deposited/stored and treated to become clear water;

a plurality of desalination structures/facilities serving, as component of the recycle structures, to remove minerals/chemicals out from the recycled water drawn from the recycle lakes;

a plurality of assembled recycled water main pipelines and water pumps inter-communicating the recycle structures with the subterranean water structures;

a plurality of underground irrigation deep-wells and tunnels, into which the recycled water are injected, and which absorb the recycled water, serving the purpose, as it is hereby imperatively emphasized, to replace the subterranean water drawn out by the deep-well pumps; and

a plurality of water ponds/lakes with porous/absorbent floors, at sea level, into which the desalinated recycled water are deposited, serving, as it is hereby imperatively emphasized, to create enough water head against the intrusion of salt water from the sea/ocean into the land.

CLAIM-5. A new apparatus that minimizes the usage of the clean drinking water and maximizes the usage of the low-grade water habitation communities, in accordance with Claim-1, including a new structural component in water supply systems serving as means for minimizing the cost of energy spent for storing water in various different elevations,

wherein, in order to minimize the energy spent in pumping water supply to plurality of storage tanks constructed in various places of different elevations, a plurality of houses and/or buildings of practically equal elevations are selected/grouped together by means of a water supply pipeline made common to all the selected houses in the group;

wherein, a water storage tank, having a float valve-controlled switch on/off that automatically stops water in-flow when the tank gets full, is constructed and/or installed near a house of highest elevation in a group of houses/buildings of

practically equal elevation, and the tank is communicated to the common pipeline of same group --- in order to supply each house in the group with water at approximately the minimum pressure required, wherein as a result, the water pressure at the lowest elevation house does not differ from the water pressure at the highest elevation house, --- and in order to minimize energy spent in pumping water up to a particular storage tank corresponding to the common elevation of the group of houses/buildings; and

wherein, in a large municipality/city/county, a plurality of groups of houses and buildings having common elevation are created and segregated around the municipality/ county, each group having a common water supply pipeline that is separated and distinct from the pipelines of the other groups, and a water storage tank, corresponding to the size of each group, is installed within each group and communicated to the group's common pipeline.

CLAIM-**6:** A new apparatus that minimizes the usage of the clean drinking water and maximizes the usage of the low-grade water, in accordance with Claim-1, wherein as a part of the new apparatus and in support to the mission of Claim-1, a new one-way check-valve has been created, -- comprising:

a section of a water pipe or a box pipe, cut to form a drum in a vertical position, serving as main compartment, having a bottom end, and a top end;

a top cover plate having a large central hole, a top face, and a bottom face, and centrally attached to cover the top end of the drum/compartment;

a lower cover plate, having a large central hole, a top face, and a bottom face, and centrally attached to cover the bottom end of the drum/compartment;

the central hole of the lower plate having an upper lip;

the lower cover plate made thick enough so that the upper lip of its central hole is evenly chamfered serving as valve sit;

a bent-down control bar, having a central hole, centrally attached to the bottom face of the upper cover plate at a horizontal posture, -- serving as bumper;

an upper pipe nipple, having a top end, and having a bottom end centrally attached to

the top face of the top cover plate and enclosing the central hole of the top cover plate, -- serving as a pipe connector;

a lower pipe nipple, having an upper inside wall, a lower inside wall, a bottom end, and having an upper end centrally attached to the bottom face of the lower cover plate, enclosing the hole of the cover plate, and serving as a pipe connector;

an upper horizontal control bar, having a central hole, centrally attached to the upper inside walls of the lower pipe nipple;

a lower horizontal control bar evenly spaced below the upper control bar, having a central hole, centrally attached to the lower inside walls of the lower pipe nipple;

a horizontal circular plate valve made thick enough to be stiff, having a diameter a few millimeters larger than the diameter of the chamfered valve sit, having a top face, a bottom face, and having a lower edge chamfered and finely grinded to fit water-tightly on the valve sit;

a vertical cylindrical control tail bar loosely piercing thru the hole of each of the upper and the lower horizontal control bars, having an upper end centrally attached to the bottom face of the plate valve;

a vertical cylindrical control head bar loosely piercing thru the center hole of the bent-down control bar, having a lower end centrally attached to the top face of the plate valve, and having an upper end extended sufficiently above the bent-down bar when the plate valve is sited; and

a rust free regulator spring coiled around the head bar, set between the bent-down control bar and the top face of the plate valve, -- serving to force the plate valve down to the valve sit when the water stops pushing upward.